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ABSTRACT

Results of an evaluation of the Washington Higher Education Telecommunication System (WHETS) are summarized. The system links Washington State University (WSU) in Pullman and the University of Washington (UW) in Seattle with the off-campus sites in Spokane, Tri-Cities, and Vancouver. The system also expands the microwave link between WSU and the University of Idaho. While the system combines several techniques, it is based on the development of a statewide interactive microwave system. Courses are offered primarily in engineering fields and computer science, although the system has also provided business and education courses. Current programming originates primarily from WSU, with selected courses also available from UW. An overview is provided of the promotion of WHETS, its course selection and scheduling, faculty orientation, evaluation, and future plans. The opinions of students and faculty concerning the delivery of courses through WHETS are summarized, including system effectiveness, instructor effectiveness, and program strengths and weaknesses. Also summarized are instructors' comparisons of off-campus and on-campus students. Student and faculty member's suggestions for changes in WHETS courses are also included. (SW)

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INTERACTIVE MICROWAVE: EXTENDING THE INSTITUTION TO THE STATE

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INTERACTIVE MICROWAVE: EXTENDING THE INSTITUTION TO THE STATE

Southwest Washington State has seen a tremendous growth in high technology industries in the past 5-7 years. In the beginning, however, continued growth was threatened by a lack of graduate education opportunities for industry employees, especially engineers.

A coalition of industry and legislative representatives in 1982 approached Washington State University to respond to the need for graduate programming in the area. The challenge was to find a means of delivering quality credit programs from a main campus located 350 miles away.

Various delivery options were considered: travelling faculty, resident faculty, adjunct faculty, videotape courses, interactive microwave and satellite delivery. The final solution combined several techniques, but was based on the development of a statewide interactive microwave system. This alternative also provided a mechanism to expand programming to Spokane, in the northeast portion of the state, and Tri-Cities (Richland), located in south central Washington.

The system is now known as the Washington Higher Education Telecommunication System, or WHETS. It links Washington State University (WSU) in Pullman, and the University of Washington (UW) in Seattle, with the off-campus sites in Spokane, Tri-Cities and Vancouver. The system also expands the existing microwave link between WSU and the University of Idaho.

Current programming on the system originates primarily from WSU, with selected courses also available from UW. Courses are offered primarily in engineering fields and computer science, although the system has been utilized effectively to deliver business and education courses. Noncredit engineering shortcourses are scheduled on the system in the near future.

System administration on the WSU campus is conducted jointly. Technical aspects and studio scheduling are coordinated by Radio-Television Services, the same unit that originally engineered and constructed the statewide system.. WHETS programming is coordinated through Continuing Education and Public Service, consistent with procedures for coordinating other off-campus courses.

Promotion

Especially during the first year of WHETS, it was as important to sell the system itself as the courses and programs it delivered. Potential audiences were both numerous and diverse: not only students, but industry representatives, community leaders, legislative representatives (including those who had supported funding the system and those who had not), faculty and staff from WSU and cooperating institutions, and staff from the off-campus centers served by the system.

Several kinds of promotion efforts were used to reach these audiences. Discussions with administrators and potential faculty on campus and with various off-campus constituencies were held at every feasible opportunity. These discussions were supplemented with written materials developed for faculty, students and general audiences. Feature articles and news releases were also used extensively both to anticipate the first courses and report on their success.

Perhaps the most ambitious effort was a statewide news conference over the system, with audiences in each of the five sites served by WHETS.

In the final analysis, the fact that the system really worked served as its best promotion. WHETS delivery by its second semester was accepted with few questions by both faculty and students. Demand for use of the system has grown dramatically with each semester.

Course Selection and Scheduling

As long as time remains available on the system, it will be accessible to deliver both credit and noncredit offerings to off-campus locations. Maximum usage is the goal.

Highest priority is given to credit courses which are offered in support of off-campus degree programs in high technology content areas. Programs related to high technology industries, such as business administration, are also given priority. Noncredit programs are accommodated whenever possible.

The most popular course times are evening hours, Monday through Thursday, to accommodate the preferences of parttime students who work fulltime. Weekday early mornings and late afternoons are also accessible for many working adults. Courses scheduled during mid-day hours are often accessed by videotape replay during evening hours.

Less popular times are appealing to some groups. For example, courses in education have been able to take advantage of free time on WHETS on Friday afternoons and Saturdays to supplement visits on site by Pullman-based faculty.

Course selection is the responsibility of the academic unit sponsoring the degree program, in consultation with off-campus centers, students, advisory groups, and cooperating institutions.

Faculty Orientation

Faculty members new to teaching on the microwave are given access to an orientation session well before their first class. There they learn about available support services, hints on effective techniques with the system, and an overview of policies related to WHETS courses.

If they choose, faculty members can simulate a WHETS class session by teaching students in an adjacent TV classroom; the session also can be videotaped for later review.

Some faculty embrace the orientation opportunity and take full advantage of it. Others prefer to learn as they go. Both techniques can work as long as the faculty member is willing to adapt to the technology as needed.

Evaluation

Students taking courses via WHETS have been surveyed to determine their reaction to the delivery format. In general, they were well satisfied with taking a course by microwave, even though they recognized the system's shortcomings in providing discussion when large numbers of students are involved and in personalizing the learning process. Further detail is provided in the system summaries in the appendix.

Faculty teaching during the first semester were interviewed about the pros and cons of their experience. Again, the reports were generally favorable. Faculty recognized the advantages of including motivated adult learners in their regular classes. They also shared suggestions for improvement. Results are shared in the appendix.

Future Plans

Development is already underway to extend the microwave system directly to industry sites in Spokane through Instructional Television Fixed Service (ITFS). This expanded system will provide two-way audio and one-way video interaction between origination and the industry receive sites. Students in participating industries will be able to take courses at their work sites during daytime hours.

A second video channel, additional studio and classroom space, and completion of the Seattle-Vancouver leg of the system are all needed to bring the system to its original conception. Expansion of the system to other sites and possible connections with the statewide telephone telecommunications system are ideas which are only being investigated now, but hold promise for development in the future.

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Evaluation Summary
WHETS Courses
Fall 1985

The Washington Higher Education Telecommunication System (WHETS) was used to deliver four courses from Washington State University and one course from the University of Washington to WSU students in Vancouver and Spokane during fall 1985. A fifth course from WSU was delivered in part via WHETS and in part by the instructor traveling to Vancouver. This is a summary of opinions from participating students and WSU faculty regarding the delivery of those courses, including input from students taking the same courses on the Pullman campus.

I. System Effectiveness

Students in all locations rated the system as generally effective, although the ratings varied considerably among the different courses and the various locations. The fall 1985 semester represented the first time courses were offered over the system, and the ratings reflected the fact that many of the system's components worked most of the time, but not all of the time. As one student commented, "It will be an excellent system when minor bugs are worked out."

For example, most students in Spokane and Vancouver reported that usually (more often than "always" or "never") the video signal was clear, the audio signal was clear, they could hear fellow students at other sites, and they received printed class material on time. In most cases, students reported that their microphones worked all of the time. Problems with these aspects of the system were somewhat site specific, with relatively more problems reported in Vancouver (370 miles from Pullman) than in Spokane (75 miles from Pullman).

Reactions were evenly split (among "always," "usually," and "never") regarding whether or not students felt as though they were part of the class, even though they watched the course on TV. This feedback was particularly course specific.

A problem frequently cited by students was lack of ease in asking questions. Students commented through the site coordinators that they often felt as if they were interrupting or "bursting in" the lecture when they initiated a question over the system. Instructors who actively encouraged participation by requesting comments and questions periodically seemed to be most successful in overcoming this feeling on the part of students.

Students in a graduate education course had an experience unique from those in other WHETS courses. The education students (20 of them) were all in Vancouver; the instructor was in Pullman with no students in the WSU studio. The reactions of these students were somewhat less positive than for other WHETS courses, although both positive and negative comments were received. None of these students had ever experienced a course by telecommunication before and several commented on its impersonal aspects.

On the positive side, students pointed out advantages of using the system. For example, one student from Pullman mentioned that the videotape capability provided an opportunity for physical demonstrations that would be otherwise unavailable. Another noted that participating in the WHETS course had been "a great show (educationally)."

The faculty members who taught over the system had mostly positive comments about the experience. One instructor noted he was "quite surprised at how well it (the telecommunications system) works."

On the plus side, faculty members commented that the system allowed them to reach a diverse (and more mature) group of students without leaving Pullman. They agreed with student comments that for lecture, the system worked just about as well as a regular classroom. One faculty member noted that the system forced him to make more high quality overhead transparencies than he had been able to get away with before.

The confines of the studio proved to be more positive than expected. A previously skeptical instructor commented that he had no problem sitting still to lecture, even though his typical style was to wander around the classroom. He noted, "I got so I liked it."

Both students and faculty valued the instructor site visits. Both also suggested the visits should come as soon as possible in the semester in order to help establish instructor/student rapport.

Faculty gave mixed reactions to the system orientation, conducted before the semester started. Sessions were designed to acquaint faculty with the technical aspects of the system, give suggestions for success, and provide an opportunity to practice teaching to a remote location. Some faculty felt the sessions were very valuable and worth recommending. Others would have preferred the hands-on approach: jump in and do it.

Faculty also commented on some of the difficulties of using the system. They all agreed that they had to work harder to establish rapport with the off-campus students or to "pull off" a seminar-type class. Trying to work with students by phone (during telephone office hours) and explain applied technical subjects was often frustrating; the lack of visual communication in those instances was hard to overcome.

II. Instructor Effectiveness

The instructor's effectiveness was also rated by students in the WHETS courses. Predictably, the responses were fairly course specific, but the overall view was mostly complimentary.

Students seemed to feel that, more often than not, the instructor provided adequate opportunity to ask questions during class, that the course was well organized, that instructors emphasized key points during lectures, that they spoke clearly, and that students were able to reach instructors during their telephone office hours. This feedback probably reflects the significantly larger amount of preparation time invested in WHETS courses compared with regular courses.

Students were less positive on other aspects of the instructor's effectiveness. For instance, many did not feel that the instructor's writing was always legible. Instructors whose handwriting was small and/or cramped provided the most difficult challenges for students.

The majority of students did not seem to feel that class discussions were always valuable, due perhaps to initial intimidation by the media. The amount of discussion varied considerably among courses, and ranged from a large amount in the management course to relatively small amounts in some engineering courses. One student commented that the system was very effective for lecturing, question and answer, and group presentations; it was less effective for group discussion.

III. General

Most students had not taken a course over a telecommunication system before their WHETS course. Of those who had, students reported experience with videotape courses, live television with one-way audio only (e.g. telephone access) and live one-way television (e.g. telecourse).

Those who had experienced other systems rated the WHETS system (live television with two-way video and audio) as being closest to the ideal teaching/learning environment.

Students were asked whether or not they used videotapes of the WHETS lectures as part of the course. Most students used them occasionally to catch up on a missed class. A few used them for review purposes, and a few used them as the primary delivery method.

Most off-campus students agreed there was some need for scheduled "electronic office hours" with their professor to meet using the microwave system to discuss classwork or other questions related to the course. One student suggested that the same technique might be used for seminars and discussions with an advisor.

IV. Comparison of Students

Instructors were asked to compare their off-campus students with those on campus. The off-campus students were characterized as serious students who perform very well. Their background skills in some areas tend to be rusty. But in all areas, faculty expressed the feeling that the off-campus students generally performed as well as those on campus, after an initial lag.

Faculty recognized that because the Spokane and Vancouver students work fulltime and often travel, they have less time to devote to their studies than Pullman-based students.

The off-campus students are also more application oriented and tend to become frustrated with high doses of theory. But overall, the faculty seemed to appreciated the maturity and dedication of these students. As one instructor commented, "If I had my wishes, I'd sprinkle these students throughout my on-campus classes."

V. Suggestions for Change

The feedback from both students and faculty regarding WHETS courses included some specific suggestions for change.

1. Remove mechanical barriers which inhibit interaction and communication among sites.

   a. Provide flexible remote cameras so students off-campus can be seen in close-up.

   b. Provide video telephone hookups so faculty and students can add a visual component to the discussion of class problems.

   c. Allow faculty to control the switching of cameras instead of relying on audio cues to technicians.

   d. Use more split screen technique so students can see the Pullman-based class as well as the instructor.

2. Encourage faculty to elicit questions actively, rather than waiting for students to interrupt an on-going lecture. One faculty member had success with pausing halfway through and again at the end of the class period to check each location for questions.

3. Provide better audio control for the remote locations. Students in both Pullman and the off-campus sites commented on the audio inconsistencies.

4. Improve access to backup videotapes in remote locations. A few students in Vancouver complained they were unable to gain access to the playback room often enough.

5. Improve course coordination between the off-campus and origination sites. Students commented on the difference in holiday schedules between WSU and the off-campus centers, the need for timely delivery of printed materials to students, and occasional delays in the start of microwave courses.

6. Train studio cameras on the origination site classroom so off-campus students can view the informal pre-class activities. Especially when the off-campus groups are very small, this more gradual start to the class makes the off-campus students feel more like part of the larger class and helps eliminate feelings of remoteness.

MO:sl

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System Evaluation
Washington Higher Education Telecommunications System
Fall 1985

The Washington Higher Education Telecommunications System (WHETS) was used to deliver or assist in delivering five courses from Washington State University and one course from the University of Washington to WSU students in Vancouver and Spokane during fall 1985. This is a summary of strengths and weaknesses of the program delivery method, based on input from students and faculty who participated during that first semester.

Strengths

1. WHETS allowed delivery of a single course to multiple sites and was shown to be an effective way to serve small populations in off-campus locations with limited faculty resources. It was also effective in supplementing delivery of a course to a large population of students in a single location.

2. Faculty were enthusiastic about reaching a diverse group of students by using WHETS. They were able to gain a good mix of older, dedicated students with work experience related to course content and younger students fresh with theory and new ideas.

3. The system was very effective for lecturing, question and answer sessions, and group presentations.

4. Backup tapes at each site provided a means for students to review lectures. This capability was well used by students whose travel schedules required them to miss class and by those who needed review of special topics.

5. Faculty traveled to each off-campus site at least once during the semester. This not only enhanced the interaction between students and faculty, but provided an opportunity for faculty to visit local industries and investigate potential research opportunities.

6. When logistical support was handled well, students generally liked being part of WHETS. Most students during the Fall 1985 semester seemed to enjoy being part of this "high technology" delivery system.

7. Instructors generally worked harder with WHETS courses than other courses to organize materials and plan class delivery. Being "on television" discouraged an ad lib approach to delivery, resulting in an improved class both on and off campus.

Weaknesses

1. Faculty need to apply special effort to overcome the impersonal first impression of the WHETS delivery. For example, students noted and appreciated faculty members' efforts to acknowledge the off-campus students at the beginning of each class and to encourage their questions and comments.

2. Interactive sessions on the microwave are more difficult than in a regular classroom, and the more students there are, the more problematic they become. These difficulties were overcome to a large degree by instructors who controlled the interaction by asking for input from each location on a rotating basis, rather than relying on spontaneous interaction.

3. Student-faculty interaction outside class time was limited to telephone communication. This was perceived as a problem in some applied technical courses where discussion of formulas, charts or other visual material was an integral part. Use of the WHETS system for occasional "electronic office hours" was suggested to help alleviate this problem in the future.

4. Courses with laboratory components may be especially difficult to administer via WHETS. A course with a computer-based laboratory had logistical problems that persisted throughout the term, in spite of everyone's best efforts. This may be somewhat course specific and may improve in the future as equipment and logistical support are increased.

In general, most students and faculty involved with microwave courses during their first semester were satisfied with the system. Problems cited were relatively minor and the positive potential of the system was broadly recognized.

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